

CURRICULUM

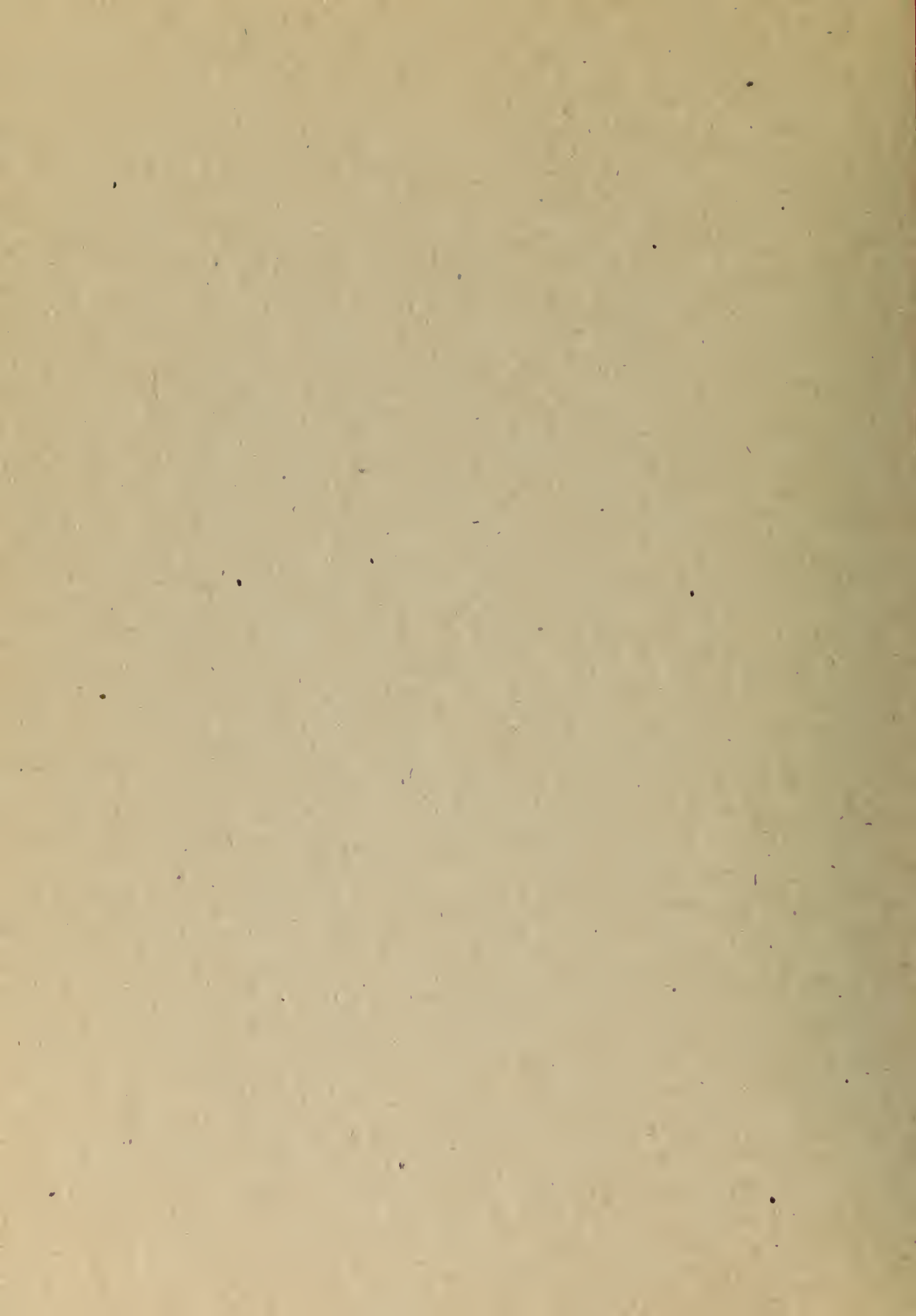
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DEPARTMENT OF EDUCATION

EDMONTON, ALBERTA

Program of Studies

for the

Junior High School

Prescribed Courses in Industrial Arts

for

Grades VII, VIII and IX

This outline is authorized by the Department of Education and supersedes all other outlines which appeared prior to September 1, 1949.

Additional copies of these Regulations may be purchased from the General Office of the Department of Education at 20 cents per copy.

September 1949



Chairman - Mr. A.P. Tingley, Supervisor of Industrial Arts.  
Secretary - Mr. W.E. Robinson, City Supervisor of Industrial Arts, Edmonton.  
Members - Mr. J.E. Heibert, Strathmore.  
Mr. S.H. Morrison, City Supervisor of Industrial Arts, Calgary.  
Mr. T.M. Perry, Technical Vice-Principal, Western Canada High School, Calgary.



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## OBJECTIVES

### Attitudes.

The experiences encountered in the Industrial Arts courses should seek to develop the following:

1. Co-operation - marked by consideration for the rights of others and willingness to contribute towards group experience.
2. Creativeness - marked by personal expression.
3. Scientific viewpoint - marked by the power to investigate problems, search for data, form **conclusions** and **evaluate one's** own judgment.
4. Social concern - marked by earnest effort to contribute towards desirable group ends.
5. Responsibility - marked by a sense of personal responsibility in carrying tasks to completion, and the acceptance of the consequences of one's own actions.
6. Self-respect - marked by personal control and cheerful compliance with measures designed to inculcate good character traits.
7. Reverence - marked by a conviction of Deity and a regard for His supreme handiwork - mankind.

### Appreciations

Experiences should seek to emphasize the following:

1. The dignity and worth of the individual
2. The dignity of honest labour, the significance of good craftsmanship and the value of honest effort involved in the development of such craftsmanship.
3. The importance of scientific and industrial developments.
4. The rich heritage of the Industrial Arts, marked by a general knowledge of the media used, the part they have played in the development of civilization and their contribution to the industrial, commercial and cultural life of today.
5. The significance of industrial developments as they affect our environment.

6. The opportunities provided through Industrial Arts experiences for creative expression.

### Understandings

Experiences should assist the student to understand that:

1. The qualities of materials govern their suitability for specific purposes.
2. Methods of processing raw materials determine their usefulness for certain jobs.
3. Certain tools are designed to be used for specific purposes.
4. Organized thinking, careful planning and precise workmanship are necessary for good craftsmanship.
5. "Safety Precautions" are necessary in order to protect the individual and the group.

### Skills and Abilities

Experiences should develop the skill to:

1. Read and interpret drawings and blueprints.
2. Use drafting equipment.
3. Produce accurate plans, marked by good design.
4. Use with increasing proficiency the more common tools and machines employed in the modifying and handling of materials.
5. Make the computations and measurements essential to the planning and construction of projects.
6. Interpret and carry out technical instructions.
7. Condition the more common tools.

NOTE: To be effective, the program should lead the student to the point where he is enabled to transfer the skills and knowledge acquired to practical situations outside the classroom.



Time Allocation:

The minimum time allocation is four periods per week.

Classes are required to continue shop attendance until the closing of the school year. For Grade IX students who are writing Departmental Examinations classes in Industrial Arts will end one week earlier.

Industrial Arts program phases:

Drafting	Concrete
Woodwork	Leathercraft
Metals	Plastics
Electricity	Bookbinding

N.B. Drafting is a compulsory unit of each year's program.

Programs for Each of the Three Years in the Junior High School Grades

Industrial Arts - First Year, Grade VII

Drafting	8 weeks	32 periods
Woodwork	20 weeks	80 periods
Metals	12 weeks	48 periods

Industrial Arts - Second Year, Grade VIII

Drafting	8 weeks	32 periods
Woodwork	16 weeks	64 periods

One to be selected from the following:

Electricity	16 weeks	64 periods
Metals	"	"
Concrete	"	"
Plastics	"	"
Leathercraft	"	"
Bookbinding	"	"

Industrial Arts - Third Year, Grade IX

Drafting	8 weeks	32 periods
Electricity	16 weeks	64 periods

One to be selected from the following:

Woodwork	16 weeks	64 periods
Metals	"	"
Leathercraft	"	"
Concrete	"	"

### Special Note:

Girls as well as boys may elect Industrial Arts as an option.

In rural areas it is recommended that the program take into account the community needs of the farm and the home.

### Special Reference

A detailed analysis of units in Industrial Arts for Grades VII, VIII, and IX is given in Improved Instruction in Industrial Arts Teaching, 1948 Edition, as recommended by the American Vocational Association. This pamphlet is authorized for use as supplementary course material.

### RECORDS

The following records should be kept:

#### Instructors' Records:

- (a) Attendance
- (b) Topics discussed
- (c) Student achievement
- (d) Tests administered
- (e) Student grading

A simple file card system is recommended for these records.

#### Students' Records:

- (a) Topics discussed
- (b) Project showing costs of materials
- (c) Demonstrations observed
- (d) Comments on field visits

### Evaluating the Progress of the Student:

Evaluation should represent the progress of the student in achieving the objectives of the program.

Developments in habits of good citizenship as well as the acquisition of skills in tool mastery should receive due consideration. Evidence of such growth may be obtained through appraisal of the student's industry, abilities, habits, project work and test results.

### Safety Education:

There is a heavy annual toll of accidents which result in suffering, heavy loss of earning power and in some cases permanent disability or death.

The responsibility of shop instructors with reference to safety should not be confined to shop activities alone; they should be concerned with the establishment of safety habits in all areas of the community. Safety factors relevant to the shop, school, farm, home and the community should receive specific attention at frequent intervals.

It is imperative that scientific safety guidance should be provided for students in shop classes. This may be done by arousing and fostering interest in safety practices. If students learn to work safely by practicing the correct technique of using tools and machines, a considerable saving in human life and suffering will be the ultimate result.

Safety rules should be posted in a conspicuous place in the shop and frequent reference made to them. Safety posters have a definite value and should be prominently displayed.

Insistence upon students practicing safety habits when working with tools and equipment should not be spasmodic, but a continuing process.

"THE BEST WAY TO PREVENT ACCIDENTS IS TO PREVENT THE CIRCUMSTANCES ARISING THAT WOULD TEND TO INVITE THEM".

" A CAREFUL MAN IS THE BEST SAFETY DEVICE KNOWN ".

The following pamphlets, obtainable from the Workmen's Compensation Board, Edmonton, are recommended for reference:

1. First Aid Service
2. Digging, Drilling, Cleaning or Repairing of Water Wells
3. Storage, Handling and Firing of Explosives
4. Trench Construction or Repairs
5. The Control of Dust
6. Logging, Saw-Mill and Woodworking, Digging, Drilling, Cleaning or repairing of Water Wells
7. Accident Prevention Committee
8. Buildings and Excavations
9. Bulletin No. 359, Section of the Workmen's Compensation Act dealing with Accident Prevention

#### METHODS:

The following procedure is recommended:

- (a) Selection of project
- (b) Investigation of requirements for its construction design, shape, proportion, disposition and strength of parts, methods of assembly, etc.

- (c) Making the working drawing and statement of cost of material.
- (d) Constructing, assembling and finishing.

Careful guidance should be given in the selection of projects since the unrestricted choice of projects by the student may result in chaos and discouragement. The student's interests, abilities, and needs should be, of course, considered as guiding factors in either the assignment or selection of projects.

N.B. Drafting should be considered as an integral part of each **phase** of the program.

#### MINIMUM REQUIREMENTS:

Since the personnel of classes is not homogeneous no minimum requirements are set out for a year's work. Achievement is expected to be commensurate with capacity. **Related theory and project activity** should be considered as complementary. Related information as the need arises is to be preferred to formal lectures and extended discussions of unrelated subject matter.

#### SHOP EQUIPMENT AND MAINTENANCE:

Environment and equipment are two important factors in enlisting the interests and industry of students. The proper implementation of programs can only be carried out if adequate equipment is available.

Tools should be properly housed; and orderly and safe procedures in their use insisted upon.

Adequate accommodation for storage purposes should be available. A separate finishing room is desirable if good results are to be secured in project finishing.

A good reference library is essential.

The importance of good English, both written and oral, should be stressed.

"Every teacher must be a teacher of English". Incorrect sentence structures and spelling errors should be carefully checked. Clear, concise expression should be encouraged.

#### COMBINATION OF GRADES

In some smaller centres it may be found necessary to combine certain classes in shop work. This procedure should be followed only if the number of students in the combined group is small and adequate accommodation and equipment are available.

In single-grade classes the enrollment should not exceed twenty.



In classes comprising students of more than one grade the enrollment should not exceed fifteen.

## OUTLINE OF COURSES

### DRAFTING

Since Drafting is a compulsory unit of each year's program, it is important that certain basic principles be observed.

The student should gain a working knowledge of the important fundamentals of Mechanical Drawing, and should develop certain sound habits in his working with drawing equipment. The naming, manipulation and care of equipment is essential training. Emphasis should be placed upon the need for neatness and exactness and the adherence to standard practices of drafting. Students of Mechanical Drawing should be confronted with problems, the solution of which involves the understanding of methods of projection, the language of the lines, accuracy, exactness and ability to read simple blueprints.

**Mechanical** Drawing demands instruction and demonstration from the instructor, and the completion of selected drawing activities from the student. Care must be taken to make certain that the students understand that they are confronted with problems for which they are to find a solution. The reproduction of prepared plans - that is copy work - should be discouraged. Each student's drawing should take the form of plates, which, when completed, should be carefully graded.

### INDUSTRIAL ARTS - First Year, Grade VII

Drafting	8 weeks	32 periods
Woodwork	20 weeks	80 periods
Metals	12 weeks	48 periods



## DRAFTING

The first year's work should involve lessons and demonstrations concerning the equipment and its proper use; the orthographic projection as it applies to simple objects and projects; the use and meaning of mechanical drawing to scale; printing suitable for mechanical drawing. It is suggested that the following work be completed by each student: exercises involving the manipulation of T-square and triangles, printing exercises, simple orthographic drawing to scale, spacing arrangements and blueprint reading.

## WOODWORK

### Related Theory

#### 1. Hand tools and processes

- (1) Names and uses of tools
- (2) How to operate different types of saws:
  - (a) cross cut
  - (b) rip
  - (c) back
  - (d) coping
  - (e) keyhole
  - (f) bow
  - (g) compass
- (3) How to assemble and adjust a plane
- (4) How to select different types of planes
  - (a) jointer
  - (b) jack
  - (c) ~~smooth~~
  - (d) block
  - (e) spokeshave
  - (f) router
  - (g) draw-knife
- (5) How to sharpen a plane
- (6) How to use the chisel
  - (a) mortise
  - (b) paring
  - (c) trimming
- (7) How to use the boring tools
- (8) The different types of bits
  - (a) auger
  - (b) drill
  - (c) forstner
- (9) How to drill for screws
- (10) How to use other miscellaneous, commonly used tools
  - (a) try-square
  - (b) compass
  - (c) hammer
  - (d) nail set
  - (e) marking gauge
  - (f) T bevel
  - (g) hand drill

2. Forests, lumbering and lumber

- (1) Forest conservation
- (2) How lumber is seasoned
- (3) Lumbering procedures
  - (a) logging
  - (b) sawmilling
- (4) Properties and uses of common woods
  - (a) hard
  - (b) soft
  - (c) recognition
  - (d) structure

3. Wood finishing

- (1) How sandpaper is made
- (2) The finishing materials
  - (a) Filler, selection and application
  - (b) Stains, water, oil; uses and application
  - (c) How to apply and rub down varnish
  - (d) How to care for brushes
  - (e) How to apply paints and enamels

Projects and operations

Simple projects involving the following operations should be selected.

- 1. Squaring a board to given dimensions
- 2. Testing a board for squareness or wind
- 3. Gauging lines with rule or marking gauge
- 4. Sawing with rip and cross-cut saws
- 5. Making a chamfer, edges and ends
- 6. Horizontal and vertical chiselling
- 7. Vertical and horizontal boring
- 8. Drilling with hand drill and automatic push-drill
- 9. Making a template
- 10. Transferring pattern to stock
- 11. Use of coping and bow saw
- 12. Cutting a dado or housed joint
- 13. Cutting a cross-lap joint
- 14. Fastening with nails, glue, screws
- 15. Use of sandpaper
- 16. Simple wood finishing
  - (a) oil
  - (b) varnish
  - (c) paint



## METALS

### Related Theory

Source of common metals such as iron (tinplate, galvanized black) copper, brass, aluminum.

### Metal Fastenings

Soldering - soft  
Riveting - types

### Metal Finishes

Polishes  
Paints, lacquers, etc., as required in finishing projects

### Common Sheet Metal

Working tools; soldering copper, hack-saw, file, taps and dies, layout tools, snip mallets and hammers, metal and wire gauges.

### Sheet Metal Projects

Projects should be chosen involving simple operations in laying out, folding, hemming and soldering. The following list is suggestive of the type of projects that might well be chosen:

Key tag, baggage tag, match striker, soap dish, match box, small tray, cake pan, closet rod holder, mending plates for broken furniture, cookie cutter, repair jobs.

### Primary References

It is recommended that "Instructional Units Woodworking for Junior High Schools"; Brown and Tustison, be used as a basic text for Industrial Arts for Grades VII and VIII, and that "Woodwork Practice and Theory"; Wishart, be used for Industrial Arts Grade IX. "Instructional Units in Woodworking for Junior High Schools"; Brown and Tustinson, also contains valuable test material. "Safe Practice In Woodworking"; Silvius and Benjsinger is also recommended.

### Secondary References

General Drafting; Frylund & Kepler  
A Primer of Blueprint Reading; Diamond  
Modern Drafting; Johnson & Newkirk  
Methods of Measurement; Cornetet  
Woodwork for Junior High School; Hamilton  
General Shop Woodworking; Frylund & LaBerge  
General Shop Handbook; Willoughby & Chamberlain  
The Art of Woodturning; Klenke

Fundamentals of Shopwork; Johson & Newkirk  
Household Mechanics; Bedel & Gardner  
Shopwork for Farm Boys; Thurmond  
Farmers' Shop Book; Roehl  
Metal Crafts; Johnson & Newkirk  
General Shop Metal Work; A.W. & K.L. Dragoo

INDUSTRIAL ARTS - Second Year, Grade VIII

Drafting	8 weeks	32 periods
Woodwork	16 weeks	64 periods

One of the following:

Electricity

Metals

Concrete

16 weeks

64 periods

Plastics

Bookbinding

Leathercraft

DRAFTING

Further experiences in blueprint and plan reading should be provided. Orthographic projection should be reviewed and continued with suitable student exercises. Other plates could include a drawing of a turned project and elementary surface development. Straight line isometric may be introduced.

Emphasis should be placed upon the careful planning of the student's own shop work projects.

## WOODWORK

### Related Theory

#### 1. Forests, lumbering and lumber

- (1) How lumber is seasoned (a) Air (b) Kiln
- (2) The grading of lumber
- (3) Sizes and dimensions of sawed lumber
- (4) Properties and uses of various woods
  - (a) grain (b) shrinkage (c) warpage

#### 2. Hand tools and processes

- (1) Edge tool cutting action
  - (a) chisel (b) rip saw (c) cross-cut
- (2) How to select and use abrasives
  - (a) sand paper (b) pumice stone (c) rottenstone

#### 3. Power tools and processes

- (1) The turning lathe
  - (a) Names and uses of various parts
  - (b) How to calculate and select speed and cone pulleys
  - (c) When to use the various chisels
  - (d) How to sharpen tools
  - (e) How to use the face plate
- (2) Power drill
  - (a) How to adjust
  - (b) How to select speed
  - (c) How to clamp and adjust material for drilling
- (3) Scroll saw
  - (a) Adjusting the blade
  - (b) Selecting blade for use
  - (c) Adjusting guide post
  - (d) How to feed a board into the saw
- (4) Bandsaw: Uses and precautions
  - (a) Adjusting the blade
  - (b) Selecting blade for use
  - (c) Adjusting guide post
  - (d) How to feed the board into the saw

## Projects and Operations

Projects involving more difficult tool operations should be chosen. Reasons for the use of different types of joints should be made clear. Some simple wood turning would prove interesting and profitable.

1. Make and put into use various types of joints
  - (a) Glue joints - edge to edge
  - (b) Doweled joint
  - (c) Rabbet joint
  - (d) Mortise and tenon
2. Apply hardware in the form of hinges and fasteners
3. Wood finishing
  - (a) Filler - selection and application
  - (b) Stains - water, spirit oil, acid
  - (c) Use of shellac
  - (d) Rubbing paint and varnish
  - (e) Removing paint and varnish
  - (f) Care of brushes
  - (g) Application of paints, enamels and lacquers

The practical application of the skills in tool mastery should be kept in mind.

## METALS

### Related Theory

Common metals and their alloys  
Identification of common metals  
Shop safety  
Care of tools.

### Bench Operations

Laying-out, locating centres, sawing, chiseling, filing, riveting, tapping, threading, bending, twisting, punching, (solid, hollow, hand punches, etc.)

The grinding wheel - its safe use in conditioning chisels, centre punches, hammer faces, etc.



## Metal Finishes

Enamel, lacquer, rackle finish, etc.

## Projects

Choose projects that will give practice in the use of scale, caliper rule, micrometer, combination square, dividers, surface gauge, etc. These may be : lamp bracket, pocket wrench, calipers, pocket square, riveting hammer, wood lathe, chisels, etc.

## References:

"101 Metalworking Projects"; Petersen  
"Hand-wrought Ironwork"; Krom Paige  
"Metalwork Made Easy"; Becker  
"General Shop Work"; Ashcroft and Easton

## Sheet Metal

Suggested metals to be used: tinplate, galvanized black iron, zinc.

Projects chosen should be of a more difficult nature than those selected in the metal section of Industrial Arts for Grade VII.

## Band Iron

Projects selected should involve simple fundamental operations such as cutting, filing, drilling and riveting.

Suggested Projects: House numbers, foot scrapers, brackets, bookends.

## ELECTRICITY

Magnetism - permanent and electro magnets

Electrical terms - volt, ampere, ohm, watt, kilowatt

Safety precautions - short circuits and grounds

Conductors of electricity - recognition and purpose of different kinds of wire, rubber covered bell wire, magnet wire, resistance wire.

Insulators of electricity - rubber, glass, cotton, paper, enamels, shellac, slate, wood.

Symbols - symbols necessary for bell circuits, safety precautions, safety devices, the fuse; electric light switches, single pole, double pole and single pole double throw; ground connections.

Circuits - connecting such circuits as a simple bell circuit, bells in series and parallel, two bells, in parallel, controlled by push buttons.

Soldering - soldering coppers, tinning, fluxes

Taping

Meter-Reading

Projects

The following joints should be made - Western Union Tee, knotted tee, Britannia. These should be soldered and at least one joint taped. The making of a small electric light cord complete with plug and socket, is good experience. One or more of the following projects is recommended - Electroscope, Magnetic Compass, Quiz Board, Telegraph and Key, Electric Top, Crystal Set.

## CONCRETE

Related Theory

Manufacture of cement

Concrete and its uses

Principles of form construction

Aggregates

Proportioning and mixing

Reinforcing

Curing and finishing

Surface treatment - stucco - colors

Waterproofing

Equipment for mixing and handling - screens, tampers, boards, spading tools, floats, trowels.

Projects

Projects undertaken can be suited to either rural or urban communities. Opportunities will often arise in connection with the school, home or farm to carry out practical projects such as the construction of steps, gate posts, building blocks, floors and foundations for small buildings, chimney cap, flower box and walks.

## PLASTICS

Related Theory

Modern developments in the manufacture and use of plastics.  
Composition.

Definitions: binder, filler, coloring matter, lubricants, etc.

Classification: (a) Thermo setting  
(b) Thermoplastic

Hand tools used in working plastics - fret saw, hand drill, bits, files, sandpaper, felt polishing sticks.

Power tools suitable for working plastics - hand saw and jig saw (may be used for certain types), lathe, drill press and abrasive steel.

### Projects

The following list offers some suggestion regarding projects:

Toilet articles, handles, jewelry, buttons, buckles, beads, signs, shade pulls, desk sets, name plates, lamps, paper knives and inlays.

### LEATHERCRAFT

#### Related Theory

Sources of leather  
Tanning and manufacture  
Characteristics  
Types  
Uses  
Methods of fastening  
Decoration

#### Processes

Cutting, folding, skiving, attaching eyelets, snap fasteners and zippers, cementing, lacing, riveting, stitching, punching, tooling, modelling, dyeing, and staining.

#### Projects

The following list offers a wide range from which projects may be chosen:

Baggage labels, key cases, belts, wrist watch straps, whisk broom holders, purses, cuffs, leggings, scissors case, hunting knife case, book ends, bill folds, card cases, halters, bridles, hand bags.





## BOOKBINDING

### Related Theory

History of bookbinding (brief)  
Industrial book making and bookbinding  
Care of books  
Tools and equipment  
Materials and supplies  
**Definitions**  
Processes

### Projects:

The following list offers some suggested projects:  
Photograph album, note book, memorandum pad, binding loose sheets, binding magazines.

### References

References recommended are those listed in Industrial Arts for Grade VII with the addition of the following:

"Junior Electricity"; Darling  
"Projects In Electricity"; Collings  
"Fundamentals of Electricity"; Johnson & Newkirk  
"Bookbinding Made Easy"; Kleinfelter  
"Shop Projects in Electricity"; Lehman  
"General Bookbinding"; Groneman  
"**The Ceramic Arts**"; Johnson & Newkirk  
"General Plastics"; Cherry  
"Plastics - The Story of an Industry"; (pamphlet) - Society of the Plastics Industry Inc., New York  
"Mechanical Technology Catalogue No. 205"; (Buffalo Forge Co., Buffalo)  
"Practical Concrete Work"; Cambell and Beyer  
"Concrete Handbook of Permanent Farm Construction"; (Portland Cement Co., 33 West Grand Ave., Chicago 10 Illinois)  
"General Leathercraft"; Cherry  
"New Designs for Leathercraft"; Hoefer  
"The Leathercraftsman"; Snyder  
"The Electrical Crafts"; Johnson & Newkirk

## INDUSTRIAL ARTS - Third Year, Grade IX

### DRAFTING

Blueprint and plan reading: **more** advanced isometric. Translation of orthographic to isometric and vice versa. Problems in surface development, tracing and blueprinting should be undertaken. Close attention should be directed to the recognized drafting conventions such as layouts, lettering, dimensioning, etc.

### Magnetism reviewed

What is a natural magnet?  
What is a permanent magnet?  
What is an electromagnet?  
Where do you find electromagnets used?  
Can magnetism be insulated?

Demonstrate or have students find the answer by using the following materials: a magnet, glass, a piece of rubber, copper, wood and finally a piece of iron.

What is a magnet line of force?  
What is the law of attraction and repulsion?

Demonstrate or have the students try this experiment with the use of two horse-shoe permanent magnets, a compass, iron filings and a sheet of cardboard.

1st test - magnets placed 1" apart with like poles opposite.  
2nd test - magnets placed 1" apart with unlike poles opposite.  
3rd test - a bar magnet.

Sketch the magnetic field that was observed.

### Forms of Electricity

Static electricity demonstrate with the use of an electroscope, a sheet of paper, piece of silk, a comb.  
Why are gasoline trucks required to carry a dragging chain.

Current electricity - Demonstrate the principle of the battery (chemical action) a galvanometer, a piece of zinc, a piece of copper, a piece of blotting paper saturated with a salt solution. Demonstrate the principle of the generator using a permanent magnet and a coil of wire or a telephone magneto.

What is direct current?  
What is alternating current?  
What kind of current is used in your home?  
Review the following terms - volt, ampere, ohm, watt and kilowatt.

### Ohm's Law

Questions:

1. Applying Ohm's Law, what voltage is required to force 10 amperes through a resistance of 12 ohms?

2. The resistance of an incandescent lamp is 480 ohms. How much voltage is required to force 0.25 amperes through it?
3. The resistance of an automobile headlight was found to be 1.25 ohms. What pressure is required to cause 5 amperes to flow?
4. How much current in amperes will flow through a circuit of 3 ohms under a pressure of 1.5 volts?
5. If a 120 volt lamp required  $1/4$  ampere to illuminate properly, how much power in watts does the lamp consume?

### Direct current motor

Demonstrate the principle of the D.C. Motor (Attraction and repulsion) with a coil of wire (100 turns of No. 20) mounted on a shaft, a permanent horse shoe magnet and two dry cells.

### Mutual induction

Demonstrate how electricity may be induced from one coil to another to show briefly the principles of the transformer.

Materials: a laminated core 1" diameter 8" long wound with two separate coils, (each wound with about 100 turns of No. 20 or 22 wire) a dry cell and a galvanometer. Show by making and breaking the battery circuit how a current is induced in the other coil as the lines of force increase and decrease. The A.C. performs this in a similar manner.

### Brief discussions

The principle of the radio.

### Projects

Two of the following projects may be sufficient:

A two coil sounder (wiring up a key sounder with batteries or transformers);  
wood burner; electric door latch; small bell transformer; door chimes; electric motor; 1-tube battery set; two tube all electric radio.

### WOODWORK

### Related Theory

Make a more advanced and detailed study of the topics listed for Industrial Arts for Grade VIII.

1. Power tools and processes.

Jointer; uses and precautions  
(a) adjust blades

- (b) adjust tables
- (c) handling stock
- (d) adjust for a miter cut
- (e) how to cut a rabbet, chamfer or taper
- (f) stop miter

2. How to use and care for the grinding wheel

- (a) how to calculate surface speed
- (b) equalize the wear
- (c) grinding angles
- (d) the safety precautions

3. Wood Fastenings

- (1) How to make various types of wood joints
  - (a) mortise and tenon - haunched etc.
  - (b) miter
  - (c) simple dove tail
- (2) How to fasten a table top
- (3) How to use clamps (a) box (b) hand screw
  - (c) the C Clamps
- (4) How to fit hinges
- (5) Know the uses and nomenclature of various nails and screws

4. Wood Finishing

- (1) When and where to use various solvents and thinners, linseed oil, turpentine, alcohol, benzine, naptha, mineral spirits amyl-acetate

5. Miscellaneous

- (1) How to upholster a board structure
- (2) Refasten broken furniture by glue

Projects

Projects identified with student, home and community needs should be chosen. The projects in this year's work should bear evidence of good design, craftsmanship and finish.

METALS

Related Theory

A further study of topics suggested in previous programs  
Estimating costs of jobs  
Occupational opportunities in the metal working trades

## Projects

Projects of a more difficult nature in sheet metal, band iron, and bench metal should be chosen with particular attention devoted to design as associated with utility. A higher standard of craftsmanship should be required in this year's work.

Forging may be included at centres where community needs would be served by its introduction. The following outline may be used.

The forge - its operation and maintenance

Heat treatment of metals - annealing, hardening and tempering

## Projects

Simple projects should be selected involving forging operations of drawing out, bending, twisting, etc. The following list is suggestive: gate hook, staple, cold chisel, clevis and pin, door stop, hay hook, projects of a more difficult nature in sheet metal and band iron.

Art Metal - Some elementary work in art metal involving the use of copper, brass, pewter or aluminum could be taken in place of forging where no forge is available.

## CONCRETE

### Related Theory

A more detailed study of the topics suggested in the previous program

Estimating cost of jobs

Occupational opportunities associated with the manufacture of cement and its use in construction

### Projects

Opportunities for the construction of practical projects associated with the needs of the school, the home, the farm and the community, should be sought.

## LEATHERCRAFT

### Related Theory

A more detailed study of the sources and manufacture of leather

Commercial importance

Uses in industry

Manufacture of shoes



Substitutes for leather  
Occupational opportunities in leathercraft trades

### Projects

More difficult projects with particular attention directed toward design, construction and finish. The list suggested in the Industrial Arts for Grade VIII programs offers a wide variety of projects and others will suggest themselves as student needs are discovered.

## PLASTICS

### Related Theory

A more detailed study of topics suggested in the Industrial Arts for Grade VIII program.

Commercial importance

Uses in the fields of **construction**, furniture, fabrics, etc.

Occupational opportunities in the field of plastics

### Projects

More difficult projects from the list suggested in the program in industrial Arts for Grade VIII may be selected or others substituted.

## BOOKBINDING

### Related Theory

A more detailed study of the topics suggested in the second year's work

Estimating costs of work

Occupational opportunities

### Projects

Projects of a more difficult nature may be undertaken such as repairing and rebinding old books. The classroom or school library offers a splendid opportunity for practical work.

### References

The reference list submitted for the Industrial Arts for Grade VII and VIII programs offers a wide variety of good reference materials. Additional references are:

"Job Operations in Farm Mechanics"; Dickson

"The Carpenter's Square and Its Use"; (pamphlet) Romig (State Building Congress, Portland, Oregon)

"Planning"; Harshbarger

"Design"; Gredey

"Canadian Plastics" (monthly magazine); (341, Church St., Toronto 2)



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